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Utility Model Application

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Title: Piston for internal combustion engines
subject to severe thermal loads

Piston for internal combustion engines subject to severe
thermal loads

The invention relates to internal combustion engine pistons
5 subject to severe thermal loads, in which channels are
provided in the crown zone through which a coolant, e.g.
cooling oil, flows for better heat dissipation.

In embodiments of such pistons known hitherto, the coolant
10 channels are always so designed that the coolant is
conveyed one or more times around the entire piston
circumference in one or more turns. In such cases, it is
inevitable that heat dissipation is significantly poorer in
the area of coolant outflow than in the area of coolant
15 inflow. With appropriate arrangement of the inflow and
outflow, this may be advantageous in certain special cases,
e.g. in the case of diesel pistons with a combustion
chamber arranged eccentrically relative to the longitudinal
axis of the piston, i.e. where heat is incident
20 asymmetrically relative to the geometric axis of the
piston, but in general it results undesirably in the
geometric axis of the piston parts cooled in this way being
shifted in the direction of the less well cooled zones in
the event of heating.

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According to the invention, this disadvantage may be
eliminated in that channels each with an inflow and outflow
are arranged for cooling the piston crown in such a way
that two separate coolant streams pass through them each
30 over only half the circumference of the piston, preferably

in the same direction of rotation. With this arrangement, it is possible to ensure that mutually opposing parts of the piston circumference in each case assume the same operating temperatures, such that the thermal expansion of 5 the relevant zones of the piston takes place symmetrically relative to the geometric axis of the piston. Furthermore, the cooling action is improved in that the ratio of the heat transfer surface areas to the oil flow area is more favourable when the coolant stream is divided into two sub- 10 streams.

In this arrangement, the inflows and optionally also the outflows of the channels are appropriately arranged in the area of the pin bosses, as is conventional.

15 The channels themselves may be formed, for example, in an annular duct cast into the crown zone of the piston, which duct is divided into two semicircles between the mouths of the inflows and outflows in each case by a partition wall.

20 An exemplary embodiment of the subject matter of the invention is illustrated in the drawings, in which:

Fig. 1 shows a longitudinal section taken 25 perpendicularly to the pin axis through a piston provided with cooling channels,

Fig. 2 shows a longitudinal section through the pin axis,

30 Fig. 3 is a plan view of the cast-in parts, in which the cooling channels are formed.

An annular duct 2 is cast into the crown part of the piston 1, the cavity of which duct 2 is subdivided by two partition walls 3 into two semicircles. Each of these semicircles has an inflow 4 and an outflow 5 and the 5 arrangement is such that each partition wall is located between the closely adjacent inflow and outflow ducts of the semicircular air channels.

The feed ducts 4 are connected to annular chambers 6 formed 10 in the pin bosses, into which chambers there lead in turn bores 8 extending from the hollow piston pin 7. The cavity of the pin 7 is likewise connected via a bore 9 with an annular chamber in the connecting rod, not shown, provided in known manner with a longitudinal bore, such that in 15 known manner oil may be conveyed in the direction of the arrows into the two semicircular channels formed in the annular duct 2, where it takes up heat, and whence it flows back again via the outflow lines 5, which exit at suitable points.

Claims

1. A piston for internal combustion engines subject to severe thermal loads, having channels in the crown zone through which a coolant, e.g. cooling oil, flows, characterised in that channels each with an inflow and outflow are arranged in such a way that two separate coolant streams each flow through only half the circumference of the piston, preferably in the same direction of rotation.
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2. A piston according to claim 1, characterised in that the inflows and optionally also the outflows of the channels are arranged in the area of the pin bosses.
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3. A piston according to claim 1 or claim 2, characterised in that the channels are formed in an annular duct cast into the crown zone of the piston, which duct is divided into two semicircles between the mouths of the inflows and outflows in each case by a partition wall.
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